under maximal, whilst a disturbance of the relationship of auricular and ventricular contractions may be induced.

(c.) *The area of the heart to which stimulation is applied.*—A refractory period demonstrable under stimulation of the ventricle may cease to occur when the sinus venosus is the seat of irritation.

(d.) *The action of heat, cold, and drugs.*—Thus cold prolongs the systole, the refractory period, and the latency of an induced contraction; whilst strychnia, leaving the curve of systole unaltered, lengthens the refractory period to a marked degree.

VII. "On the Action of Ammonia and its Salts, and of Hydrocyanic Acid upon Muscle and Nerve." By T. LAUDER BRUNTON, M.D., F.R.S., and THEODORE CASH, M.D. Received May 26, 1881.

(Abstract.)

Ammonia.—The curve caused by stimulating either muscle or nerve is prolonged. Fatigue increases this prolongation much more rapidly than it would do in the case of a healthy muscle. The viscosity, or residual contraction, remaining after active contraction is much more increased in the case of direct (muscle) than of indirect (nerve) stimulation.

Chloride of Ammonium.—A powerful, though slightly lengthened, contraction occurs on direct stimulation. The muscle, as stimulated from the nerve, yields a few (if any) lengthened and feeble contractions, and then ceases to respond altogether to stimulation.

Nitrate of Ammonium.—The nerve, in this case, is not more affected by the poison than the muscle. If the poisoning be very complete, neither direct nor indirect stimulation has any effect; if it is not so, the curve is observed to be prolonged. In the case of both, but especially in that of the directly stimulated muscle, the contraction remaining after stimulation is very extensive.

Nitrite of Ammonium.—If poisoning be complete, no reaction occurs either on direct or indirect stimulation; if not, the curves of both are much prolonged, even more so than in the case of the nitrate. The rapid repetition of stimulation causes the curve to become enormously prolonged, whilst the viscosity after the active contraction is much increased.

Cyanide of Ammonium.—Stimulation of the nerve produces no effect whatever; whilst that of the muscle causes a considerable though prolonged curve. Viscosity is much increased. The curve of hydrocyanic acid alone, yielded by both direct and indirect stimulation, is prolonged, but it neither shows the length nor the viscosity of the

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cyanide muscle curve; whilst its nervous contraction is still powerful in contrast to the utter loss of excitability in the latter.

The *latency* varies in the case of the different salts of ammonia. Thus, in stimulating the nerve, it is much lengthened in the chloride, and still more so in the cyanide—if the muscle be examined soon enough to yield response to nerve stimulation—it is increased slightly by ammonia, and by its nitrate and nitrite. In direct stimulation, the latency appears to be increased in the cyanide nitrate and nitrite, unaltered in the chloride and hydrocyanic acid, and unaltered or slightly decreased in the early stages of poisoning by ammonia.

VIII. "On Stratified Discharges. VI. Shadows of Striæ." By WILLIAM SPOTTISWOODE, President R.S., and J. FLETCHER MOULTON, F.R.S. Received May 27, 1881.

One of the most interesting questions connected with the subject of stratified discharges is this: What is the physical, as distinguished from the electrical, nature of the striæ themselves? Are they, in fact, to be regarded as aggregations of matter possessing greater density than the gas present in the dark spaces, or are they to be considered as indicating merely special local electrical conditions? The fact of their having a definite configuration, especially on the side which is turned towards the negative terminal of the tube, that of their temperature being higher than that of the dark spaces, the manner in which they are affected by solid bodies, and other considerations, all tend to give support to the view that the striæ are loci of greater density than the dark spaces. Still it can hardly be said that as yet any experimental proof of this has been given, sufficiently decisive to decide the question conclusively. And it is in the hope of contributing something towards the solution of this question that the following experiments are submitted to the notice of the Royal Society.

In the former papers of this series ("Proc. Roy. Soc.," vols. 23, 27), and in our memoirs "On the Sensitive State of Vacuum Discharges" ("Phil. Trans.," 1879, p. 155, and 1880, p. 561), we have described experiments which show how a discharge through a tube, whether sensitive or non-sensitive, may be affected in various ways by intermittent discharges *ab extra*. In the experiments now to be described the problem has been reversed, and it has been proposed to ascertain how far such an external discharge can itself be affected by the internal one. The discharge *ab extra*, however, presents such feeble luminosity, that it is not possible to come to any certain conclusions on this head by direct methods. But, as has been before pointed out,